What is claimed is:

1. A magneto-optic optical device, comprising:

at least one magnetooptical crystal;

a magnetic field application mechanism for applying to the magnetooptical crystal a magnetic field component in a direction vertical to a light entrance/exit plane; and

at least one electromagnet for changing a position where the magnetic field component applied to the magnetooptical crystal becomes 0.

2. A magneto-optic optical device according to claim 1, wherein the magnetic field application mechanism includes at least one permanent magnet.

3. A magneto-optic optical device according to claim 1, wherein a magnitude of the magnetic field component is monotonously changed in a specified direction in the light entrance/exit plane.

4. A magneto-optic optical device according to claim 3, wherein the magnetooptical crystal includes a magnetic domain A constituted by a magnetization in a direction vertical to the light entrance/exit plane, and

a magnetic domain B constituted by a magnetization in an opposite direction to the magnetization direction of the magnetic domain A.

5. A magneto-optic optical device according to claim 4, wherein the magnetic field generated by the electromagnet is changed to form a state where only the magnetic domain A exists in a light transmission region of the magnetooptical crystal and a state where both the magnetic domain A and the magnetic domain B are contained, and a transmitted light intensity is continuously changed.

6. A magneto-optic optical device according to claim 5, wherein a state where only the magnetic domain B exists is formed.

7. A magneto-optic optical device according to claim 5, wherein in the state where both the magnetic domain A and the magnetic domain B are contained, a boundary between the magnetic domain A and the magnetic domain B is almost linear.

8. A magneto-optic optical device according to claim 1, wherein a saturation Faraday rotation angle of the magnetooptical crystal is about 45°; and

the magneto-optic optical device further comprising:

a polarizer disposed at one side of the magnetooptical crystal; and

an analyzer disposed at the opposite side of the magnetooptical crystal.

9. A magneto-optic optical device according to claim 1, wherein a saturation Faraday rotation angle of the magnetooptical crystal is about 90°; and

the magneto-optic optical device further comprising:

a polarizer disposed at one side of the magnetooptical crystal; and

an analyzer disposed at the opposite side of the magnetooptical crystal.

10. A magneto-optic optical device according to claim 1, wherein a saturation Faraday rotation angle of the magnetooptical crystal is about 45°; and

the magneto-optic optical device further comprising:

a polarizer disposed at one side of the magnetooptical crystal; and

a reflecting film disposed at the opposite side of the magnetooptical crystal.

11. A magneto-optic optical device according to

claim 1, wherein the magneto-optic optical device is a variable optical attenuator for variably controlling an attenuation by changing a current applied to the electromagnet.

12. A magneto-optic optical device according to claim 1, wherein the magneto-optic optical device is an optical modulator for modulating a transmitted light intensity by modulating a current applied to the electromagnet.

13. A magneto-optic optical device according to claim 1, wherein the magneto-optic optical device is an optical switch.